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THE EFFECTS OF TYPING INSTRUCTION ON THE PERSONALITY AND ACHIEVEMENT OF EDUCABLE MENTALLY HANDICAPPED CHILDREN.

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TO STUDY WHETHER TEACHING TYPING TO EDUCABLE MENTALLY HANDICAPPED STUDENTS WOULD RESULT IN IMPROVING ACADEMIC WORK, GREATER VISUALIZATION SKILLS, AND BETTER SOCIAL-EMOTIONAL ADJUSTMENT, THE EXPERIMENTAL HALF OF THE 14 MATCHED PAIRS OF CHILDREN 10 TO 13 YEARS OF AGE WITH MEASURED IQ'S BETWEEN 50 AND 80 WERE GIVEN 2 TO 3 YEARS OF TYPING INSTRUCTION. TWELVE TESTS WERE GIVEN TO ALL SUBJECTS BEFORE AND AFTER THE EXPERIMENTAL PERIOD TO MEASURE EDUCATIONAL ACHIEVEMENT, PERSONALITY AND SOCIAL DEVELOPMENT, VISUAL MOTOR ABILITIES, AND AUDITORY ABILITIES. ONLY TWO OF THE SEVEN MEASURES OF ACADEMIC ACHIEVEMENT SIGNIFICANTLY FAVORED THE EXPERIMENTAL GROUP (P=.05). THE DIFFERENCES IN VISUALIZATION SKILLS BETWEEN THE TWO GROUPS DID NOT APPROACH SIGNIFICANCE (P=.05), AND THIS HYPOTHESIS WAS REJECTED. ONLY TWO OUT OF THE SEVEN TESTS OF SOCIAL-EMOTIONAL ADJUSTMENT SIGNIFICANTLY FAVORED THE EXPERIMENTAL GROUP (P=.05). THE MAJOR IMPLICATIONS ARE (1) TRANSFER OF LEARNING FROM THE USE OF THE TYPEWRITER TO OTHER SKILLS MUST BE TAUGHT AND (2) SOME STUDENTS SHOWED POTENTIAL FOR ACQUIRING TYPING AS A SALABLE SKILL. SUGGESTIONS FOR FURTHER STUDY ARE INCLUDED. NINETEEN REFERENCES ARE LISTED. (RS)

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The Effects of Typing Instruction on the Personality and Achievement of Educable Mentally Handicapped Children

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Champaign Community Unit 4 Schools
Department of Special Services
E. H. Mellon
Superintendent of Schools
August, 1963

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FOREWORD

This report represents one of a series of research projects conducted by the Department of Special Services in an attempt to obtain new knowledge to guide us in improving the educational program for exceptional children.

Since powers of retention of the mentally handicapped are limited, greater reinforcement of learnings through repetition is essential. It was thought that the use of typewriters as a tool to provide the repetition and the specialized typing program might be beneficial in reinforcing the learnings of this segment of our school population.

Children of limited intellectual ability can become contributing members of society. It is with sincere concern that we have engaged in this research to improve the school program for them.

E. H. Mellon
Superintendent of Schools

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Chapter I

INTRODUCTION

Problem and Need for the Study

The mentally handicapped appear to profit most from teaching techniques and methods of instruction designed to meet the specific needs arising from their limited intellectual ability. Since their powers of retension are limited, greater reinforcement of learnings through repetition is essential. In this connection, the question is raised as to the efficacy of the typewriter as a valuable tool to provide the repetition and specialized type of experiences necessary to reinforce their learnings. The typewriter appears to offer many opportunities for reinforcement of classroom learnings by tactitle, motor, and visual stimulation.

Anna Mae Gallagher (1959) developed a curriculum - the Keyboard Town Story - for the educable mentally handicapped in which the typewriter is used as the basic tool for facilitating learning. She reports, based on subjective evaluation, that the children taught by this method have progressed in the areas of reading and spelling at a more rapid rate than educable mentally handicapped children provided with a conventional curriculum. Pupils taught to type, according to observation, are able to retain the learned materials longer and to apply their learnings more readily to other situations than are educable mentally handicapped pupils taught by more conventional curricula which do not usually include the teaching of typing as an integral part of the curriculum. She also has observed that there have been favorable changes in the personality of these children who have experienced educational successes through the use of the typewriter. They appear to have gained self-confidence and a greater feeling of personal worth. Kirk (1959), after observing this program in operation, commented that he believed, "... that

the typing method itself develops a high level of visualizing ability in mentally retarded children which is transferable to reading and spelling in particular.' "...Children who have gone through this curriculum seemed to be able to reproduce visual symbols from memory at a higher level than I have seen of children of comparable mental age and IQ."

Since Mrs. Gallagher published her manual in 1959 on the curriculum entailing the use of the typewriter in teaching the educable mentally handicapped, various school systems in the United States and Canada have initiated such programs for the mentally handicapped. To our knowledge, none of these school systems have, however, set up their programs using this curriculum on a research basis.

Although there has been a general renewal of interest in the typewriter as a tool for enhancing the school learning of all pupils, an intensive review of the literature uncovered no studies investigating the role of the typewriter as a device for facilitating learning among the mentally handicapped. From a theoretical point of view, an investigation of the effects of the use of the typewriter in teaching the mentally handicapped was expected to add to the general body of information pertaining to the acquisition and retention of complex skills and the reinforcement of newly acquired materials. From an applied point of view, this study evaluated the appropriateness of the Keyboard Town Story as a basic method for teaching mentally handicapped children.

Review of Relevant Research Studies

Early studies on the efficacy of the typewriter as an educational tool were concerned with the effects of typewriting on handwriting. Many of these studies used adult or adolescent subjects. Some researchers concentrated on younger children (Conrad, 1935). In general, the findings

indicated that the use of typewriting with children does not affect handwriting detrimentally.

Another group of early studies was concerned with the teaching of typing per se to elementary school children. Results of such investigations showed generally that elementary age children could learn successfully the skill of typewriting. But as Hutchings aptly stated: "It must be understood that the primary purpose of teaching typewriting in the lower grades is not to develop actual ability to typewrite (not that such skill, even at an early age, would not be valuable), but rather to achieve other values that seem to result from including typing instruction." (Hutchings, 1951, p. 499)

The most significant of the early studies investigating the effects of typewriting on achievement in various tool subjects were those of Forrester (1934), Wood (1932), Haefner (1937), Unzicker (1934), and Freeman (1932). Wood and Freeman (1932) found that children who used the typewriter advanced more rapidly in all subject matter areas in elementary school than did children who did not use the typewriter. Unzicker (1934) discovered that first grade pupils could profit from typing and believed that in beginning reading classes there tended to be a slight by constant superiority in reading in favor of pupils who used the typewriter. In summarizing the early research in this area, Haefner (1937) concluded that typing facilitated reading attainment by helping children to distinguish between similar words and to select a specific word from a group with similar spellings. He noted that typing helped children perceive the detailed character of words which is a fundamental skill in accurate reading. Typing influenced the children not only to increase the total valume of written work but it also had some good effects

on the quality of the written work such as the use of longer sentences and words. Haefner observed that typing also facilitated work in arithmetic. He concluded: "... through its effects on the three R's the typewriter touches in some degree, most of the other activities that are important in the education of children." (Haefner, 1937, p. 30)

Although these early studies indicated that teaching typing had a favorable influence upon achievement in other academic areas, in the period between the late 1930's to the early 1950's there was comparatively little research on the use of the typewriter with elementary school age children. Interest in the area was revived in the 1950's and research articles on the use of typing with elementary age children began to appear more frequently in educational journals.

The most significant recent studies were those reported by Durrell, Erickson and Moore (Manual Portable Typewriter, 1960). These were three separate research projects conducted under grants from a typewriter firm. Findings of these research projects indicate that fourth and fifth grade pupils of varying intellectual ability were all able to learn to type and benefit from it. Pupils who learned typewriting also evidenced a slight gain in both the speed and quality of their handwriting. Erickson (1960) found no significant differences in capitalization and punctuation between his two groups as a result of typing. The major purpose of these studies was to investigate the effect of the use of the typewriter on educational achievement. In general, the findings revealed that the introduction of the typewriter into the instructional program did not deter general educational achievement.

An intensive review of the research concerned with typing among elementary age children was conducted by Capehart and McNish (1959). In general, the studies showed that through the use of the typewriter:

(1) pupils tended to spell, read and write better; (2) their papers were neater, they learned to punctuage, paragraph and proof read; (3) they made more projects and displays; (4) they took pride in their work, they tended to have an improved attitude toward school work; (5) they became more responsible and more independent; (6) they felt successful and more self-confident; (7) creative expression was stimulated; and (8) they were able to acquire typing skills. Capehart and McNish believed that the typewriter seemed to be valuable as a teaching tool in the elementary grades although there was a great need for more research in this area.

A search of the literature failed to reveal any reported objective study of the use of the typewriter in facilitating the educational achievement of educable mentally handicapped pupils. Unzicker's (1934) study with first grade children indicated that those children in the lower ranges of intelligence were the ones whose progress in reading was aided most by the use of the typewriter. Unzicker cautioned that this comparison was made on the basis of raw scores and unweighted averages and should, therefore, not be interpreted too broadly. The assessment of the intellectual ability of subjects in Unzicker's study was sometimes made with the Stanford-Binet Scale and sometimes with a group test of mental ability. The scores from the two different measuring scales would, of course, not be equivalent.

Scobee (1947) studied the educational attainment of slow learners in remedial reading classes and found that the group made perfect scores in spelling tests after using the typewriter a week and also had a heightened interest in reading. The research by Erickson and Clow (1959) indicates that fifth grade pupils with high intelligence quotients can type faster and apply their typewriting skill better in composition and report work than can pupils with lower intelligence

quotients. These authors concluded that the typewriter can be used effectively and has educational value in improving work habits, developing skill in the mechanics of English, improving composition skills, increasing the speed and quality of handwriting, and decreasing the time needed for writing reports in various subject matter areas. There was, however, no evidence that use of the typewriter had a desirable effect on general academic achievement. Olson and Jaskari (1955) studied the effects of typewriting on children in grades one through nine. They observed that some children who were handicapped in other subjects because of reading difficulties were able to do well in typing. They concluded that for most pupils, achievement in typing was commensurate with attainment in other subjects, but for pupils with reading retardation, achievement in typing may surpass the attainment in the academic areas of reading, arithmetic and writing. This finding may have implications for the educable mentally handicapped who, as a group, typically have considerable difficulty in learning to read.

Summary of Related Research

A search of the literature disclosed that there have been no reported objective study of the influence of the typewriter upon the educational achievement of elementary age children who are mentally handicapped. Studies conducted with children of average ability have yielded implications that typewriting might be an effective tool for use with retarded children. Yet, more research is needed to investigate the most effective method of teaching typing to elementary age pupils. Studies such as those by Durrell, Erickson and Moore (Manual Portable Typewriter, 1960) need to be supported by other investigations so that educators may have a more adequate basis for appraising the value of including typewriting in a program for elementary age children. Other extensive studies such as

those of Wood, Freeman and Haefner need to be substantiated under present day conditions, utulizing the more advanced research techniques and evaluative procedures which have been developed in recent years. Extraneous variables and the lack of control groups for comparison purposes also rendered the findings of some studies equivocal. The research methods of many earlier studies have not been clearly described and many seem to be based more upon observation rather than a quantifiable, experimental approach. The educational contribution of the typewriter in the school program for elementary age children continues to await final evaluation. The value of the use of the typewriter with the mentally handicapped on a research basis is unexplored.

Hypotheses

Although no specific reports investigating objectively the use of the typewriter in the education of the mentally retarded pupils were found, it has been suggested that the typewriter fosters favorable academic, personal and social development of pupils of average ability. There is reason to believe that the use of typewriters would foster favorable academic achievement for the educable mentally handicapped. The greater degree of visual, motor, and tactile stimulation in typing should reinforce classroom learning for the educable mentally handicapped pupil, thereby facilitating academic success and subsequently promoting comparably favorable personality and social changes. These relationships may be expressed in the following hypotheses:

1. Educable mentally handicapped pupils taught typing comprehend printed material better than do educable mentally handicapped pupils taught by a conventional curriculum (i.e., make higher scores on an achievement test measuring paragraph meaning).

2. Educable mentally handicapped pupils taught typing comprehend more printed words than do educable mentally handicapped pupils taught by a conventional curriculum (i.e., make higher scores on an achievement test measuring word meaning).
3. Educable mentally handicapped pupils taught typing will spell more words correctly than do educable mentally handicapped pupils taught by a conventional curriculum (i.e., make higher scores on a spelling test).
4. Educable mentally retarded pupils taught typing are able to solve more arithmetic reasoning problems than do educable mentally handicapped pupils taught by a conventional curriculum (i.e., make higher scores on a test measuring arithmetic reasoning).
5. Educable mentally handicapped pupils taught typing are able to compute more arithmetic problems correctly than are educable mentally handicapped pupils taught by a conventional curriculum (i.e., make higher scores on an arithmetic computation test).
6. Educable mentally handicapped pupils taught typing have a greater vocabulary than do educable mentally handicapped pupils taught by a conventional curriculum (i.e., have higher scores on a vocabulary test).
7. Educable mentally handicapped pupils taught typing see themselves as more accepted and intrinsically valued by their parents than do educable mentally handicapped pupils taught by a conventional curriculum (i.e., have higher scores on a scale measuring perceived parent attitudes of acceptance and intrinsic valuation).
8. Educable mentally handicapped pupils taught typing have a higher degree of self-confidence than do educable mentally handicapped

pupils taught by a conventional curriculum (i.e., see themselves as more able to cope with a variety of appropriate tasks).

9. Educable mentally handicapped pupils taught typing have a higher degree of realistic self-confidence than do educable mentally handicapped pupils taught by a conventional curriculum (i.e., see themselves as less able to cope with a variety of inappropriate tasks).

10. Educable mentally handicapped pupils taught typing have a greater degree of social independence and self-reliance than do educable mentally handicapped pupils taught by a conventional curriculum (i.e. have higher scores on a scale measuring these aspects of social maturity).

11. Educable mentally handicapped pupils taught typing have a higher degree of visual discrimination ability than do educable mentally handicapped pupils taught by a conventional curriculum (i.e., make higher scores on a scale measuring retention of visual forms).

12. Educable mentally handicapped pupils taught typing have a higher degree of memory for letters in sequence than do educable mentally handicapped pupils taught by a conventional curriculum (i.e., make higher scores on a test measuring memory for letters in sequence).

13. Educable mentally handicapped pupils taught typing have a higher degree of memory for forms in sequence than do educable mentally handicapped pupils taught by a conventional curriculum (i.e., make higher scores on a test measuring memory for forms in sequence).

14. Educable mentally handicapped pupils taught typing have a higher degree of eye-hand motor coordination than do educable mentally handicapped pupils taught by a conventional curriculum (i.e., have higher scores on a test of speed of eye-hand coordination).

Chapter II

METHOD

Selection of Subjects

The subjects were chosen from pupils in special classes for the educable mentally handicapped. These pupils had been classified as educable mentally handicapped (IQ 50-80) by qualified psychological examiners on the basis of findings obtained in a complete individual psychological examination, including assessment of school learning ability with the 1960 Stanford-Binet Intelligence Scale. All educable mentally handicapped pupils enrolled in special classes in the Champaign schools who were 10 years, 0 months to 13 years, 0 months were screened, and those who had observable indications of sensory-motor impairment (paralyses, deformities, history of seizures) were not included in the study. In September, 1960, 13 pupils were selected as the experimental group. The subjects in the experimental group were matched with other pupils of the same sex, racial group membership, chronological age, IQ score, and educational achievement. An additional 9 matched pairs of subjects were added to the study in September, 1961, raising the total number of pairs to 22. However, 8 pairs of subjects were eventually lost from the study as a result of one or both members of a pair moving from the community. This reduced the total number of pairs to 14. A summary of the characteristics of the two groups is presented in table 1.

Table 1

CHARACTERISTICS OF SUBJECTS AS OF SEPTEMBER, 1960

	Experimental	Control
N	14	14
N of Boys	8	8
N of Girls	6	6
Mean CA	10.8	10.9
Mean IQ	73.2	73.5
Mean MA	8.7	8.9
Mean Reading Level	2.8	2.4

As would be expected since the two groups were matched, they, as shown in Table 1, did not differ significantly with respect to boy-girl ratio, chronological age, mental age, or measured intelligence. The subjects came predominately from lower than average socio-economic backgrounds.

Procedure

Experimental subjects received treatment for two years (N = 7) or three years (N = 7). The 14 subjects in the experimental group were placed in two classes and were taught typing for approximately 45 minutes each day following the method described in the Keyboard Town Story. Basically, this method of teaching typing involves associative learning in which there are story characters (representing the keys) like those the pupils might meet in school, at home, or in the community. The things that these people do downtown and uptown are associated with the keys on the typewriter. As the pupils learn this story which holds interest and appeal for them, they also learn the keys on the typewriter keyboard. No formal application of typing is undertaken until the entire keyboard has been learned. The time allotted to typing was divided equally between lessons and exercises from the typing

manual and from lessons on their regular school work such as spelling and social studies. There was one typewriter for every two experimental subjects.

The 14 pupils in the control group were in other special classes and followed the regular curriculum for the educable mentally handicapped as outlined in the Illinois Curriculum for the Educable Mentally Handicapped. The teachers of the experimental and control groups of subjects were qualified teachers of the educable mentally handicapped. One of the teachers of the experimental group had several conferences with the author of the Keyboard Town Story and spent one week observing this method in operation in order to become familiar with this method of teaching typing to mentally retarded pupils. The teachers of the experimental group followed this curriculum.

Measuring Instruments

The following measuring instruments were administered to all subjects by qualified psychological examiners in the fall of 1960 or 1961 (pre-test data) and were re-administered at the conclusion of this study in May of 1963:

Educational Achievement

Stanford Achievement Test
- Paragraph Meaning
- Word Meaning
- Sprlling
- Arithmetic Reasoning
- Arithmetic Computation

California Achievement Test
- Mechanics of English

Peabody Picture Vocabulary Test

Personality and Social Development

Perceived Parent Attitudes Scale (a scale devised by Ausubel, et al, 1954, to measure the child's perceptions of the parental attitudes of acceptance-rejection and intrinsic-extrinsic evaluation)

Could You Ever (a scale devised by George McCoy, former Champaign psychologist, to assess realism of goal setting among mentally handicapped children)

Vineland Social Maturity Scale

Visual-Motor Abilities

Benton Visual Retention Test

Monroe Letter Memory Test (a scale for measuring memory for letter sequence)

Memory for Visual Designs Test (a scale testing memory for form sequence utilizing nonsense designs devised by the Champaign staff)

WISC Digit Symbol Test

Perceptual Speed and Accuracy (a subtest from the Primary Mental Abilities Test)

Auditory Abilities

Monroe Sound Blending Test (a test designed to measure the ability to fuse sounds presented orally into words)

With the exception of the Stanford and California Achievement Tests, the above listed instruments were administered individually and read aloud when appropriate.

Chapter III

STATISTICAL FINDINGS

Since it was hypothesized that the subjects in the experimental group would manifest greater gains when compared to subjects in the control group, one-tailed values of significance were used in the interpretation of the statistical tests of the differences attributed to treatment between the groups. Two-tailed values were used to determine the significance of differences between the groups on initial measures. Only those values which would occur by chance less than once in twenty times ($p = .05$) were considered as representing statistically significant differences. The significance of the differences between the two groups was evaluated by a t test (t_D) of the differences between the matched subjects (Walker and Lev, 1953, p. 153).

Findings Relative to Hypotheses

The data comparing the two groups with respect to the hypotheses under investigation in this study are presented in Tables 2, 3, and 4.

Table 2

COMPARISON OF DIFFERENCE IN ACHIEVEMENT BETWEEN SUBJECTS ON PRE-TEST AND GAIN SCORES (N = 14)

	Pre-test t_D	Gain Scores t_D
Paragraph Meaning	1.43	.36
Word Meaning	1.76	.72
Spelling	1.62	1.04
Arithmetic Reasoning	2.18*	.30
Arithmetic Computation	1.00	1.77*
Mechanics of Language	.67	1.90*
Peabody Picture Vocabulary	-.10	.01

* = .05 level of significance; t = 2.11 for 2 tailed test, and t = 1.77 for 1 tailed test. Minus is in favor of the control group.

Table 3

COMPARISON OF DIFFERENCE IN VISUALIZATION ABILITIEBS
BETWEEN MATCHED SUBJECTS ON PRE-TEST AND GAIN SCORES
(N = 14)

	Pre-test t_D	Gain Scores t_D
Digit Symbol (WISC)	1.23	-.44
Benton Visual Retention Test	.72	-1.03
Monroe Visual Letters	-.25	.26
Perceptual Speed and Accuracy	.47	1.09
Visual Sequence	-.25	.89

* = .05 level of significance; t = 2.11 for 2 tailed test, and t = 1.77 for 1 tailed test. Minus is in favor of the control group.

Table 4

COMPARISON OF DIFFERENCE IN SOCIAL AND EMOTIONAL SCORES
BETWEEN MATCHED SUBJECTS ON PRE-TEST AND GAIN SCORES
(N = 14)

	Pre-test t_D	Gain Scores t_D
Could You Ever		
Appropriate Tasks	.55	.32
Inappropriate Tasks	-.10	3.82**
Vineland Social Maturity Scale	1.70	2.54*
Perceived Parent Attitudes		
Extrinsic-Intrinsic Evaluation	1.05	.34
Acceptance-Rejection	.55	.09

* = .05 level of significance; t = 2.11 for 2 tailed test, and t = 1.77 for 1 tailed test.
** = .01 level of significance, t = 2.65 for 1 tailed test.
Minus is in favor of the control group.

Inspection of Tables 2, 3, and 4 reveals only limited support for the basic rationale of the study, namely, that the typewriter as used in the Keyboard Town Story curriculum is a method which enhances the educational program for educable mentally handicapped pupils.

General Hypothesis 1: Achievement

It was hypothesized that educable mentally handicapped pupils taught typing would make greater gains in academic achievement than do educable mentally handicapped pupils taught a conventional curriculum. Only two of the seven measures of academic achievement indicated statistically significant differences between the two groups (mechanics of language and arithmetic computation). There were no trends in favor of the experimental group on the other five variables tested. Thus, this hypothesis was only partially supported by the data.

General Hypothesis 2: Visualization Abilities

It was hypothesized that educable mentally handicapped pupils taught typing according to the experimental curriculum would develop greater visualization skills than do educable mentally handicapped pupils taught by a conventional curriculum. The differences in visualization skills failed to reach the designated level of statistical significance. Further evaluation of the data revealed no trends. The hypothesis was accordingly rejected.

General Hypothesis 3: Social-Emotional Area

It was hypothesized that educable mentally handicapped pupils taught typing would manifest greater social maturity, greater perceived parental acceptance, and more realistic goal setting. Analysis of the data revealed

that the experimental subjects made significantly greater gains with respect to social maturity and ability to determine inappropriate tasks than did their counterparts in the control group; however, measures of perceived parental acceptance and ability to select appropriate tasks did not reach the designated level of statistical significance. There were no trends in the three other measures of personal-social adjustment. Consequently, this hypothesis was given only partial support.

Additional Findings

In addition to information obtained to test the above hypotheses, data were gathered relative to the acquisition of typing skills. As will be observed from Table 5, the experimental subjects were typing approximately 20 gross words per minute on unfamiliar words after a 2 to 3 year period of training. The average number of gross words per minute did not differ significantly between those pupils who received only two years of typing when compared with those who received three years of typing instruction ($t = .91$). The average number of net words per minute for those pupils who received two years of typing was 1.3 as compared with 5 net words per minute for those who received 3 years of typing. Experimental subjects in the top quartile of the combined groups typed at least 25 words per minute and at least 5 net words per minute.

Table 5

RESULTS ON COMPETENT TYPIST TEST

	N	Gross Words Per Minute			Net Words Per Minute		
		Mean	Top Quartile	Range	Mean	Top Quartile	Range
Two Year Group	7	19.00	25.4	11-27	1.3	4.5	0-5
Three Year Group	6*	21.60	29.4	9-30	5.0	15.0	0-16
Two-Three Year Group	13	20.2	25.4	9-30	3.0	5.0	0-16

*One of the experimental subjects moved from the community prior to the administration of this test.

Chapter IV

DISCUSSION OF FINDINGS

The theoretical orientation for this study centered around the need for reinforcement of the learnings of educable mentally handicapped pupils. It was felt that the use of the typewriter offers many opportunities to reinforce classroom learning through tactile, motor, and visual stimulation. Thus, it was hypothesized that such reinforcements would be reflected in improved educational achievement of the subjects, particularly in areas requiring visualization. In addition, acquisition of the skills of typing seemingly would foster improved self-concept of the subjects which would result in increased self-confidence and improved social relationships.

Of the seven academic areas measured in this investigation, the experimental subjects manifested significantly greater gains in only two areas, namely, mechanics of language and arithmetic computation. Seemingly the reinforcement of the mechanics of language provided by typing resulted in improved performance in such areas as capitalization, punctuation, and word usage. This finding is consistent with studies conducted by Capehart and McNish (1959) and by Durrell (1960). Contrary to the findings of these investigations, Erickson (1960) found that there were no differences between his experimental and control subjects in the mechanics of language. The subjects in all of these previous studies, however, were of at least average intelligence.

The experimental subjects performed significantly better in the area of arithmetic computation than did the control subjects but there were no

differences on measures of arithmetic reasoning. Haefner (1937) observed that typing facilitated growth in arithmetic. On the other hand, more recent studies by Durrell (1960) and Erickson (1960) found no differences between their two groups in the area of arithmetic. Since there was only one typewriter for every two pupils, approximately half the experimental subjects was given instruction on the typewriter at one time. During the time half the group was receiving typing instruction, the other half were frequently provided with additional arithmetic drill. This extra practice in the mechanics of arithmetic could easily account for differences between the experimental and control subjects in arithmetic computation.

The experimental subjects in this study did no better than their counterparts in reading (paragraph meaning, word meaning), in spelling, or development of verbal concepts as measured by the Peabody Picture Vocabulary Test. These findings are comparable to the findings of Durrell (1960) and Erickson (1960) who found no significant differences in reading achievement.

In retrospect, it appears that typing with the mentally handicapped is basically a mechanical process which involves little comprehension of what is typed. Initially, so it seems, there was concentration on locating the correct key for a letter which was mediated by association with a character in the story. Subsequently, typing appears to have become a stimulus-response process with little conscious mediation. If this is the case, one would then expect very little transfer to other areas of learning such as reading and spelling. This would seem particularly true among the mentally handicapped who have marked difficulty in transferring learnings from one situation to another.

It was hypothesized that the use of the typewriter would facilitate the acquisition of visualization skills because it seemingly trains visual-motor modalities to a greater extent than is provided by ordinary classroom procedures. To test this hypothesis, five instruments purporting to measure visualization were administered. Some of these measures contained items made up of varying sequences of letters very similar to the kinds of materials encountered in reading and spelling. Other items contained geometric forms less similar to school-like learning tasks but which also required visual-sequential memory. A series of nonsense designs even further removed from school experiences was also administered. Contrary to the hypothesis, the experimental subjects made no greater gains in visualization than did the control subjects. Moreover, there were no trends in the hypothesized direction on any of the five measures of visualization. Thus, the use of the typewriter did not result in improved visualization abilities among these experimental subjects who were educable mentally handicapped and without known neurological and severe emotional impairment. Durrell (1960) also failed to find differences in visual memory between his experimental and control subjects who were of normal intelligence.

The experimental subjects made significantly greater gains in realistic goal setting as measured by an "inappropriate tasks" scale, than did the control subjects. In other words, the experimental subjects were more cognizant of goals that were unattainable for them.

According to the rationale of the study, more realistic goal setting would accrue from improved academic achievement facilitated by the use of the typewriter. Since there was only partial support for the hypothesis of

a generalized improvement in academic achievement, it is difficult to attribute gains in realistic goal setting to greater academic achievement. The reason for differences in realistic goal setting between the two groups is not clearly understood at this time. Teacher personality and/or teacher-pupil interaction with typing instruction may be factors influencing growth in this area. The possibility also exists that perceived success in learning the complex skill of typing resulted in increased realism of goal setting. Psychologically, it would appear that success experiences, actual or perceived, enhance realistic goal setting (Sears, 1940; Capehart and McNish, 1959).

There were no statistically significant differences between the two groups on the "appropriate tasks" measure. The "ceiling effect", which presumably accounted for the failure to find differences in this area, operated on this instrument.

According to the analysis of data on social maturity, the experimental subjects made statistically significant gains over the control subjects. It should be noted, however, that the experimental subjects tended to be somewhat more socially mature initially, thereby rendering interpretation of the result equivocal. Here again, the success experiences associated with the learning of a complex skill may have resulted in the increased self-reliance and independence which the Vineland Scale seems to measure.

There were no statistically significant differences between the experimental and control groups relative to perceived parental attitudes. In retrospect, this is not too surprising since the parents of educable mentally handicapped pupils of low socio-economic status do not generally place too high a value on education and, therefore, would likely not reward the child's success in learning to type.

Post-hoc evaluation of subjects indicates that a significant percentage (25) demonstrated potential for becoming typists who could perform jobs requiring routine copy work. On this basis, teaching typing to selected educable mentally handicapped subjects seems of prevocational value. It should be noted, however, that these selected pupils will require a longer length of time to become reasonably skilled in typing.

It was encouraging that the teachers of the experimental subjects reported that they could identify the good typists within the first few weeks of instruction. Identification, then, seems possible within a relatively short time. Thus, placement of selected mentally handicapped children in a typing program seems a reasonable procedure. It should be further noted, however, that data do not warrant the teaching of typing to all educable mentally handicapped pupils of elementary school age.

Chapter V

SUMMARY AND IMPLICATIONS

Problem

This study was concerned with investigating the efficacy of teaching typing as described in the Keyboard Town Story to educable mentally handicapped pupils. It was hypothesized that use of the typewriter with EMH pupils would result in greater academic gains, greater visualization skills, and greater gains in the social-emotional area.

Organization of Study

A total of 14 matched pairs of educable mentally handicapped children ranging in chronological ages from 10 to 13 and having intelligence quotients between 50 and 80 were included in the study. The experimental subjects who were matched with their control subjects on chronological age, mental age, IQ, sex, racial group membership and educational achievement received treatment (instruction in typing) for a minimum of two years (N = 7) or a maximum of three years (N = 7).

Measuring Devices

The subjects' levels of achievement in reading, spelling, and arithmetic were measured by an appropriate level of the Stanford Achievement Test while their level of achievement in the mechanics of language was measured by an appropriate level of the language section from the California Achievement Test. The Peabody Picture Vocabulary Test was used to measure the subjects' verbal concepts. The Digit Symbol subtest from the WISC, the Benton Visual Retention Test, the Monroe Visual Letters Test, the Perceptual Speed and Accuracy Test, and the Visual Sequence Test were all utilized to measure various aspects of visualization skills. Measures of social-emotional adjustment were provided by

the Vineland Social Maturity Scale, by the Perceived Parent Attitude Scale and by the Could You Ever Scale. The Competent Typist Test offered a measure of the subjects' typing skill.

Results

Since it was hypothesized that the subjects in the experimental group would manifest greater gains when compared to subjects in the control group, one-tailed values of significance were used in the interpretation of the statistical tests of the differences attributed to treatment between the groups. Two-tailed values were used to determine the significance of differences between the groups on initial measures. Only those values which would occur by chance less than once in twenty times ($p = .05$) were considered as representing statistically significant differences.

General Hypothesis 1: Achievement

It was hypothesized that educable mentally handicapped pupils taught typing would make greater gains in academic achievement than do educable mentally handicapped pupils taught a conventional curriculum. Only two of the seven measures of academic achievement indicated statistically significant differences between the two groups (mechanics of language and arithmetic computation). There were no trends in favor of the experimental group on the other five variables tested. Thus, this hypothesis was only partially supported by the data.

General Hypothesis 2: Visualization Abilities

It was hypothesized that educable mentally handicapped pupils taught typing according to the experimental curriculum would develop greater visualization skills than do educable mentally handicapped pupils taught by a conventional curriculum. The differences in visualization skills

failed to reach the designated level of statistical significance. Further evaluation of the data revealed no trends. The hypothesis was accordingly rejected.

General Hypothesis 3: Social-Emotional Area

It was hypothesized that educable mentally handicapped pupils taught typing would manifest greater social maturity, greater perceived parental acceptance, and more realistic goal setting. Analysis of the data revealed that the experimental subjects made significantly greater gains with respect to social maturity and ability to determine inappropriate tasks than did their counterparts in the control group; however, measures of perceived parental acceptance and ability to select appropriate tasks did not reach the designated level of statistical significance. There were no trends in the three other measures of personal-social adjustment. Consequently, this hypothesis was given only partial support.

Additional Findings

In addition to information obtained to test the above hypotheses, data were gathered relative to the acquisition of typing skills. The experimental subjects were typing approximately 20 gross words per minute on unfamiliar words after a 2 to 3 year period of training. The average number of gross words per minute did not differ significantly between those pupils who received only two years of typing when compared with those who received three years of typing instruction. The experimental subjects were typing approximately 3 net words per minute after the 2 to 3 year period of training. The average number of net words per minute for those pupils who received two years of typing was 1.3 as compared with 5 net words per minute for those who received 3 years of typing. Experimental subjects in the top quartile typed approximately 25 gross words per minute and 5 net words per minute.

Implications

Although it was hypothesized that typing would have a generalized beneficial effect on the academic and social-emotional growth of educable mentally handicapped pupils, only partial support was obtained for these hypotheses. Nevertheless, the quantitative and qualitative data do seem to suggest the following:

- Since approximately only 25 percent of the children in this study appeared to have an aptitude for learning to type, consideration should be given to developing a screening program to identify those children who can benefit from such instruction.

- Those pupils who seem to have the aptitude for learning to type should be provided with typing instruction on the basis of the prevocational benefits that can accrue from acquiring such a salable skill. Although these pupils do not have the intellectual potential to be secretaries, it is felt that with sufficient instruction and practice they can learn the skills of typewriting to the extent that they may be able to do such simple routine typing tasks as addressing envelopes, typing labels, and similar copy work.

- Since most school systems have to be concerned about costs of operating programs and since every mentally handicapped child seemingly does not have the aptitude to learn to type effectively, consideration might be given to grouping children who have an aptitude for learning to type. This would be possible only in those school systems which have a relatively large number of educable mentally handicapped pupils.

- Since there was apparently little transfer of learning from the use of the typewriter in this study, it would appear that the teachers who use typing as a tool for facilitating learning will have to give greater attention to helping the mentally handicapped transfer learnings.

Suggestions for Further Study

The findings of this study suggest the need for research in the following areas:

- A more precise procedure for predicting those mentally handicapped who can use typing skills on the job.

- The effects on achievement and personality when typing is an integral part of the curriculum of neurologically damaged mentally handicapped pupils who have specific learning disabilities.

- The changes in personality and achievement when typing is used with children who have marked emotional problems and are functioning as educable mentally handicapped.

- The long range effects of the use of the typewriter upon the general achievement and personality of the mentally handicapped.

- Differences in the rate of acquiring typing skills among mentally handicapped pupils when typing is introduced at various mental ages. (It is possible that the subjects in this study might have learned the skills of typing more readily if the teaching of typing had been delayed until they were more mature mentally.)

- Investigation of how best the learnings can be reinforced by the use of the typewriter after the Keyboard Town Story has been taught and the mentally handicapped have mastered the keyboard to the extent that the character name has dropped out.

- The most effective pupil-typewriter ratio when teaching typing to selected mentally handicapped pupils.

- More precise investigation as to the special learning problems of the mentally handicapped relative to learning to use the typewriter.

- An investigation of the effectiveness of other methods of teaching typing to the mentally handicapped.

- Further investigation of the effects of classroom atmosphere and pupil-teacher interaction in order to delineate factors involved in realistic goal setting and social maturity.

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APPENDIX

COMPETENT TYPIST TEST

Use double spacing in typing this test

(To compute speed, note the number indicated at the end of the last line you copied completely and add 1 for each additional 5 strokes typed. To get the gross speed, divide total by number of minutes; or, to get net speed, subtract 5 for each error before dividing by number of minutes.)

Vacations are the favorite subject of conversation while waiting for the time to pass until the vacation period. Pay checks are examined in hopes of locating an unsuspected addition that can make that hoped-for trip more possible. Tourist information floods homes and business places, while employees spend hours dreaming of future enjoyments.

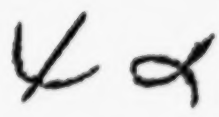
Luncheon dates are often avoided, for the beautiful sunshine beckens everyone outdoors - to stroll down the thoroughfares or to acquire a flattering tan in the various parks that dot the cities. The necessity of returning to business duties at the end of the luncheon period is forgotten in the enjoyment of the outdoor relaxation.

Besides the short time spent in acquiring a tan at lunchtime, the citizens devote many more hours to this achievement. It takes on major importance, for many thousands of pale but hopeful persons flood the nearest shores of the turbulent ocean. Their weapons are suntan cosmetics, bathing suits, and time spent drowsing on the gentle sandy grounds under the hottest sunshine. There they listen peacefully to radio music, speculate about their neighbors, dose occasionally, and sometimes actually make their adventurous path to the ocean itself for a refreshing swim.

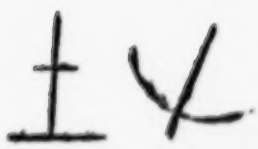
VISUAL SEQUENCE TEST

The following nonsense designs were presented individually on 4½ by 8 inch cards. Exposure time for each card was 10 seconds. The student was told to study each card carefully so that he could reproduce it from memory after the exposure.

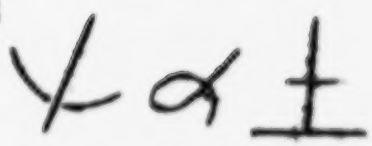
Card 1



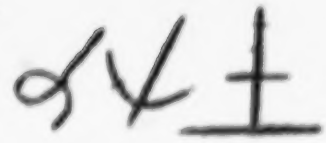
Card 2



Card 3



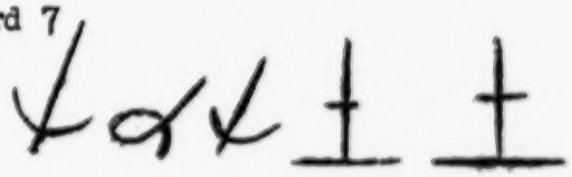
Card 4



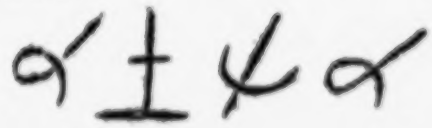
Card 5

Card 6

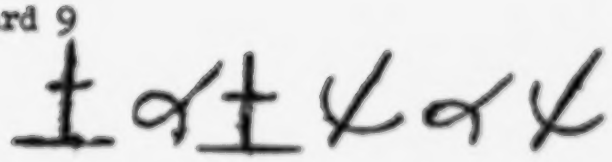
Card 7



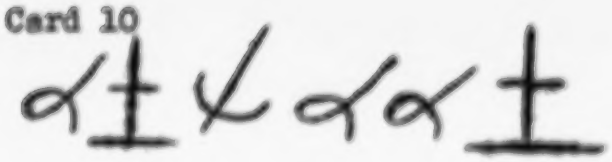
Card 8



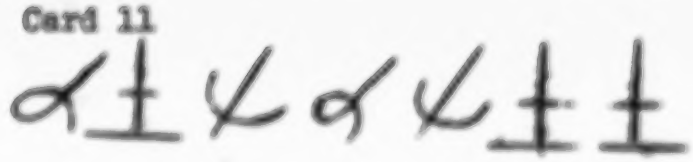
Card 9



Card 10



Card 11



Card 12

MONROE VISUAL LETTERS TEST

The following nonsense words were presented individually on 8½ by 11 inch cards. Exposure time for each card was five seconds. The subject was told to study each card carefully so that he would be able to reproduce it from memory after the exposure.

Card 1	ag
Card 2	bo
Card 3	nup
Card 4	fow
Card 5	grel
Card 6	afet
Card 7	malde
Card 8	wibry
Card 9	cuserf
Card 10	kignel
Card 11	smontir
Card 12	doponas
Card 13	rilamerp
Card 14	chiolary
Card 15	etoramubo
Card 16	smelerith
Card 17	pirnocklan
Card 18	tidvelist